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## WINTER AND SPRING WORK AGAINST THE SAN JOSE SCALE.

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The attention of orchardists and others who have the San Jose scale to combat, should be again called to the desirability of treating infested trees before the foliage puts out the coming spring. For several reasons this work should be done while the trees are more or less dormant and are denuded of leaves. At this time a spray mixture can be applied of much greater strength, and the work can be done much more thoroughly than if the leaves were present. In most cases also, there is less urgent work on hand during the winter and spring than later. Every effort therefore should be made to apply the necessary treatment to infested trees in the course of the next two months.

The necessity of treating trees infested with scale need hardly be repeated here, for it should be quite generally known by this time, that to neglect such work inevitably means the death of the trees. If your orchards are infested with scale, you have the alternative of taking the matter in hand, or sooner or later to give up fruit growing. Abundant experience in many of the eastern states has shown that the scale may be satisfactorily controlled by the employment of practical remedial measures, but it should be distinctly understood that the work must be thorough, and followed up from year to year. Where the scale has become established, there is but little likelihood of its ever being entirely eradicated, except in very exceptional cases. Consequently, efforts should be expended towards keeping it reduced below an injurious quantity. In a word we must come to realize that the San Jose scale is with us to stay, and where estab-

lished, provision must be made for keeping it in subjection as a part of the routine orchard work. As to whether or not it will pay to grow fruit with the added expense of fighting the scale, must be, from the nature of the case, an individual question. If a grower is convinced that there is no money to be made in fruit culture with this added expense, he should lose no time in putting his land in other crops, and not allow the orchard to gradually die from the effects of the scale, and prove a source of infestation for the surrounding country. There will be many, however, who will find it profitable to grow fruit under the adverse conditions mentioned, and the effect of the scale will undoubtedly tend toward a specialization of the fruit industry. Orchards will be given more undivided attention, insuring better cultivation, pruning, spraying and the handling and marketing of fruit than has, as a rule, heretofore been given. Under these conditions, the growing of fruit will continue to be highly profitable and in the writer's opinion, there is a most hopeful outlook for fruit growing in the future, if followed along these lines. There are some who affirm that this pest in its ultimate effect, will prove to be a blessing, as it will tend more and more to make fruit growing a definite business. Be that as it may, many small home orchards will doubtless be abandoned and the loss of fruit to the many, who grow it largely for family use, will be a considerable hardship. It by no means follows that the small home orchard need necessarily be abandoned; but as a rule, I have experienced considerable difficulty in inducing the general farmer to adopt the necessary measures to protect the comparatively few trees, which he has growing to furnish fruit for family use.

Our office records show that there are somewhat more than 800 cases of scale in the State, and we are constantly learning of cases new to our records. During the past summer, by the aid of local inspectors, the previous list has been largely added to, and it is likely that many more case will be found, particularly in those counties, which have not as yet been carefully investigated. It is at once evident in view of the above, that there is need of considerable work in Maryland on the part of the orchardists, if the fruit industry is to be saved, and this work should certainly be done before the trees leaf out the present spring. Growers must depend largely upon themselves in freeing their orchards and their premises from the scale. It has become an individual question, and every orchardist has it in his power to keep the scale in subjection despite the diffidence of his neighbor. This department cannot undertake to do more than to determine by inspection whether or not the scale is present in an orchard, and to give instruction, where necessary, in the proper use of the spray pump. After this, those concerned are expected to employ the necessary measures to keep the scale under proper control.

## Treatment to be Employed.

The treatment to be employed depends somewhat on the nature of the case. If the trees are badly infested, they should at once be dug up by the roots and burned. Such trees are usually too badly injured by the scale to make it worth while to attempt to save them. The question of the vitality of the trees should be carefully considered in determining the plan of action. Severe pruning, followed by a thorough spraying will frequently give satisfactory results, particularly if in addition, the trees receive good fertilization and cultivation the following season. Good judgment must be exercised in determining whether it is better to destroy an orchard, or to attempt to save it by the destruction of the scale with sprays. In general, if the infested trees, particularly peaches and plums, have been allowed to go untreated for two or three years, it would probably be wisest to remove them at once.

Where trees are only moderately infested with scale, it is quite possible to save them by thorough applications of proper spray mixtures. While it is scarcely possible to entirely free trees from scale, after they have become infested, yet if such trees be thoroughly sprayed at least once each winter or spring, injury from the insect will be comparativey insignificant. Where infested trees have been found here and there in an orchard, the scale is in all probability much more generally distributed than an inspection would ordinarily indicate. Under these circumstances, it would be better to spray the entire orchard, and in any case, spraying should not be confined to trees seen to be infested, but all those in the immediate neighborhood should be treated. Orchardists should make it a rule to be among their trees as much as possible. Any signs of failing vigor, or unnatural appearance of the bark should at once call for a close scrutiny. In this way, serious loss may frequently be prevented by detecting the presence of injurious insects or diseases as soon as possible after their establishment in the orchard. When you are in doubt as to the nature of the trouble, send specimens at once to this department and the matter will be given proper attention.

To give satisfactory results, spraying must be done very thoroughly, for it should be remembered that the scale is killed only when actually hit with the spray mixture. Special pains should therefore be taken that every part of the tree, from the crown to the topmost branches be treated. There should be a light but uniform coating of the spray over the entire surface of the tree, but drenching is not desirable. Where the spray mixture is used in excess, particularly in the case of kerosene and crude petroleum, injury to the tree is likely to result from the puddling of the mixture at the crown. Spraying should be done preferably when there is but little wind movement, and when kerosene or crude petroleum is to be used, bright sunshiny days should be selected as much as is possible. The spray nozzle should be set so that the spray will be fine and mist-like. When

rather high trees are to be treated, an extension pole is necessary by which means the nozzle may be elevated sufficiently high to reach the higher parts of the tree. In some cases, some form of scaffolding rigged up on the wagon may be useful. The person using the nozzle, by standing on this, and by the use of an extension pole will likely be able to effectively treat the topmost branches of the highest orchard trees.

## Spray Mixtures.

(1). Whale Oil Soap:—This is a most satisfactory substance to use against the San Jose scale. Its cost has doubtless prevented its more general adoption, but considered from the standpoint of its efficiency, this objection loses much of its force. Where it is necessary to have the spraying done by ordinary farm labor, the use of whale oil soap is frequently to be recommended, since the danger of careless use of the crude petroleum or kerosene is thus obviated. On pear and apple trees, the soap solution should be used at the rate of two pounds to each gallon of water, and it may be applied at any time during the winter. For peach and plum, however, it should be used at the rate of one and one-half pounds of soap to the gallon of water, and its application should not be made until shortly before the fruit buds begin to swell in the spring. Mid-winter or earlier applications of whale oil soap to peach and plum trees may have the effect of preventing the development of the fruit buds, and these are likely to be injured if the soap is used stronger than indicated. There are several brands of soap on the market, but we have found Good's Potash Whale Oil Soap No. 3, manufactured by James Good, 939 and 941 N. Front Street, Philadelphia, Pa., to be most satisfactory, dissolving sufficiently to be readily sprayed while warm, at the rate of two pounds to the gallon. In any event, potash soap should be insisted on, as the Soda soaps are likely to become more or less solidified when cold, and hence cannot be used in the spray pump. Any ordinary spray pump will be satisfactory in applying the whale oil soaps. Good's Potash Whale Oil Soap may be purchased of the manufacturer at from three to five cents per pound, depending on the quantity ordered.

(2). Crude petroleum is being used to a considerable extent in the State at the present time and with generally satisfactory results. It possesses advantages over kerosene in that it contains a larger percentage of the heavy oils and paraffine, not penetrating the bark so readily, and on the other hand, there remains after the evaporation of the lighter oils, a considerable residue which remains on the bark for some months, forming a coating which prevents from getting established, the young insects from individuals which may not have been destroyed by the treatment. Crude petroleum should be used in 25 per cent mechanical mixture with water and a special pump is necessary, such as the Gould "Kerowater." The oil and water are mechanically mixed in the operation of spraying. The treatment may

be made in the winter, or in the spring before the buds swell to any extent. The spray should be as mist-like as possible, and for securing this, we have found the Deming "Vermorel" nozzle, manufactured by the Deming Co., Salem, Ohio, to be most satisfactory. The use of pure petroleum in many cases has given satisfactory results, but its use is attended with danger, particularly in the hands of inexperienced persons. There are several grades of crude petroleum on the market, but the one to be used for insecticidal purposes should be of an amber or greenish color, with paraffine base and registering from 43 to 45 degrees on the Beaume scale. The oil may be purchased from the Standard Oil Co., Baltimore, Md., at about 9 cents per gallon in barrel lots. The price will vary somewhat depending on market fluctuations. In ordering, simply specify that an insecticidal crude petroleum is wanted, and the proper grade will be shipped out.

(3). Kerosene:—Ordinary illuminating, or coal oil in 20 per cent mechanical mixture with water is being used quite largely at the present time against the scale. From some localities on the Eastern Shore, there has been complaint of injury to the trees treated. In Western Maryland, however, but little, if any, injury seems to have been experienced. These variations in effect may possibly be due to climatic conditions, such as the relatively greater humidity of the air in the tide water section. It should be born in mind in using kerosene, that dry sunshiny days should be selected, so that the evaporation of the oil may be as rapid as possible, and the same precautions relative to drenching of trees are to be observed with even greater care than in the case of crude petroleum. Kerosene should not be applied when the trees are entirely dormant, the safest time being in the spring just as the buds are beginning to swell. I do not recommend it for use stronger than 20 per cent and suitable days should be selected. The use of pure refined oil in very careful hands may not result in injury, but its use is not advised. Where the mixture is applied in excess, injury is likely to result from its puddling around the crown. This danger may be obviated by raking up around the trunk before treatment, a mound of earth a few inches high, which should be removed with the contained kerosene a short while after the treatment.

## Spray Pumps.

There are very many spray pumps on the market, ranging from bucket pumps to barrel sprayers, and larger. For spraying on a small scale, a bucket or knapsack pump will be satisfactory. These may be purchased with or without the kerosene attachment as desired. For orchard work, a barrel pump should be used, and if it is proposed to use either crude oil or kerosene, the kerosene attachment becomes necessary. In using the kerowaters, they should be tested from time to time to determine if the proper per cent of oil is being discharged. This may be done by spraying some of the mixture into a cylindrical

jar or other cylindrical container, and allowing it to stand for a couple of hours, by which time the oil will have separated from the water, and the per cent may be readily determined. A 20-ft. or 25-ft. length of hose will allow of much more satisfactory work in the orchard, and if such is desired, it should be specified in the order. The Gould "Kerowater," which we have found most satisfactory, may be purchased of the Gould Manufacturing Co., Seneca Falls, N. Y. or their representatives in this state, the Griffith & Turner Co., Baltimore, Md. Among other firms dealing in spraying machinery should be mentioned: The Deming Co., Salem, Ohio; Morrill & Morley, Benton Harbor, Mich., and W. & B. Douglass, Middletown, Conn. Prospective purchasers of spray pumps should send for catalogues and select the pump that will most nearly meet their requirements.